

Aestabdella leiostomi sp. n. (Hirudinea: Piscicolidae) from the Gills of Spot, *Leiostomus xanthurus*, in the Lower Chesapeake Bay, Virginia¹

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ABSTRACT: *Aestabdella leiostomi* is characterized externally by a subcylindrical to flat, unpigmented body lacking tubercles, gills, and pulsatile vesicles; a large, very deeply cupped caudal sucker and 2 pairs of poorly formed eyes on the oral sucker are present. Internal anatomy is characterized by 2 pairs of esophageal diverticula, 5 pairs of testisacs, large bursa, paired conducting tissue strands connecting copulatory zone and ovisacs, expansive coelomic system lacking testicular sinuses, and 10 pairs of large nephridia. This leech is the first member of the genus from the Atlantic Ocean; it is known only from spot collected during summer from the lower Chesapeake Bay and from the Gulf of Mexico near Pascagoula, Mississippi.

KEY WORDS: *Aestabdella leiostomi* sp. n., Hirudinea, parasitology, taxonomy, *Leiostomus xanthurus*, Chesapeake Bay, Gulf of Mexico, western North Atlantic Ocean.

The marine leeches of the east coast of the United States have been relatively well studied (Sawyer et al., 1975; Appy and Dadswell, 1981; Burreson and Zwerner, 1982; Sawyer, 1986) and, thus, it was somewhat surprising to discover an undescribed species commonly infecting the abundant spot, *Leiostomus xanthurus* Lacépède (Sciaenidae), in the lower Chesapeake Bay. The leech has previously been reported as *Piscicola funduli* Pratt in a popular article on marine leeches from the Gulf of Mexico (Causey, 1954). Causey presented a photograph of a whole mount of a leech from the gill cavity of spot collected near Pascagoula, Mississippi. Sawyer et al. (1975) believed that the leech photographed by Causey was the same as their new species, *Malmiana philotherma*; however, none of the specimens of *M. philotherma* they collected was from spot. In addition, the very large, deeply cupped caudal sucker of the leech photographed by Causey (1954) resembles very closely the caudal sucker of specimens collected from spot in Chesapeake Bay. The type specimens of *M. philotherma*, on the other hand, all have smaller, much less deeply cupped caudal suckers. The similarities in morphology and host between the leeches collected by Causey and those collected by us lead us to conclude that they are the same species, described below.

Materials and Methods

Leeches were collected during summer of 1987 from the gills of spot, *Leiostomus xanthurus*. Specimens were relaxed in weak alcohol and fixed in 10% neutral-buffered formalin; some were stained with Semichon's acetocarmine and mounted whole. Specimens to be sectioned were relaxed in weak alcohol and fixed in Bouin's fluid. Two complete series of frontal, sagittal, and transverse sections were cut at 6 μm and stained with hematoxylin and eosin. Figures were drawn with the aid of a camera lucida. Measurements are in millimeters unless stated otherwise. Side by side comparisons of preserved specimens were made with the holotype (USNM 51481) and paratypes (USNM 51482, 51483, 51484) of *Malmiana philotherma* Sawyer, Lawler, and Overstreet.

Results

Leeches were most abundant near the mouth of the Chesapeake Bay below the Bay Bridge-Tunnel; however, specimens have been recovered from spot collected at the mouth of the York River. Spot were collected in most tows during a cruise in July 1987 that covered most of the Virginia portion of the Chesapeake Bay and the lower reaches of the major tributaries, but leeches were only recovered in the lower portion of the Bay near the Bay Bridge-Tunnel. During August 1987, 19 leeches were recovered from 10 of 73 spot examined, a prevalence of 13.7%. Intensity ranged from 1 to 4 leeches per host. All infested spot were collected in a single tow just inside the mouth of the Chesapeake Bay off Cape Charles, although many spot were collected at other locations in the lower Bay on the same day. Leeches were usually attached to the floor of the

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opercular cavity under the filaments of the last gill arch, but were occasionally found attached to the gill filaments themselves.

Spot, *L. xanthurus*, and croaker, *Micropogonias undulatus* (Linnaeus), were collected in coastal waters between Cape Fear and Cape Hatteras, North Carolina, in September and March, and between Cape Hatteras and Delaware Bay in September during National Marine Fisheries service ground fish surveys aboard *R/V Albatross IV*. No leeches were recovered from the 141 spot and 156 croaker examined.

Family Piscicolidae

Subfamily Platybdeillinae

Genus *Aestabdella* Burreson, 1976

***Aestabdella leiostomi* sp. n.**

(Figs. 1-5)

DIAGNOSIS: Body elongate, subcylindrical to flat, up to 11 mm total length, lacking papillae, tubercles, gills and pulsatile vesicles. Midbody segments 6(12) annulate. Caudal sucker large and deeply cupped, wider than maximum body width; oral sucker well developed with 2 pairs of poorly formed eyes. Body and suckers usually unpigmented and appearing white to cream-colored. Occasionally very faint black segmental bands on urosome and 13 triangular pigment bands on the caudal sucker radiating from urosome/sucker junction toward outer edge of sucker. Coelomic system consisting of ventral and dorsal sinuses with expansive segmental connecting sinuses that ramify extensively dorsally and laterally to fill most spaces among clitellar gland cells. Testicular sinuses are absent. The presence of lateral sinuses could not be confirmed with certainty. Male reproductive system with 5 pairs of testisacs, accessory gland cells surrounding ejaculatory ducts and atrial cornua, and moderately large bursa. Paired strands of conducting tissue connect copulatory zone and ovisacs. Ten pairs of large nephridia open laterally from XIV through XXIII.

TYPE SPECIMENS: Holotype (USNM 132421)

and 10 paratypes (USNM 132422) deposited in Division of Worms, National Museum of Natural History, Smithsonian Institution, Washington, D.C. 20560.

TYPE HOST: Spot, *Leiostomus xanthurus* La-cépède.

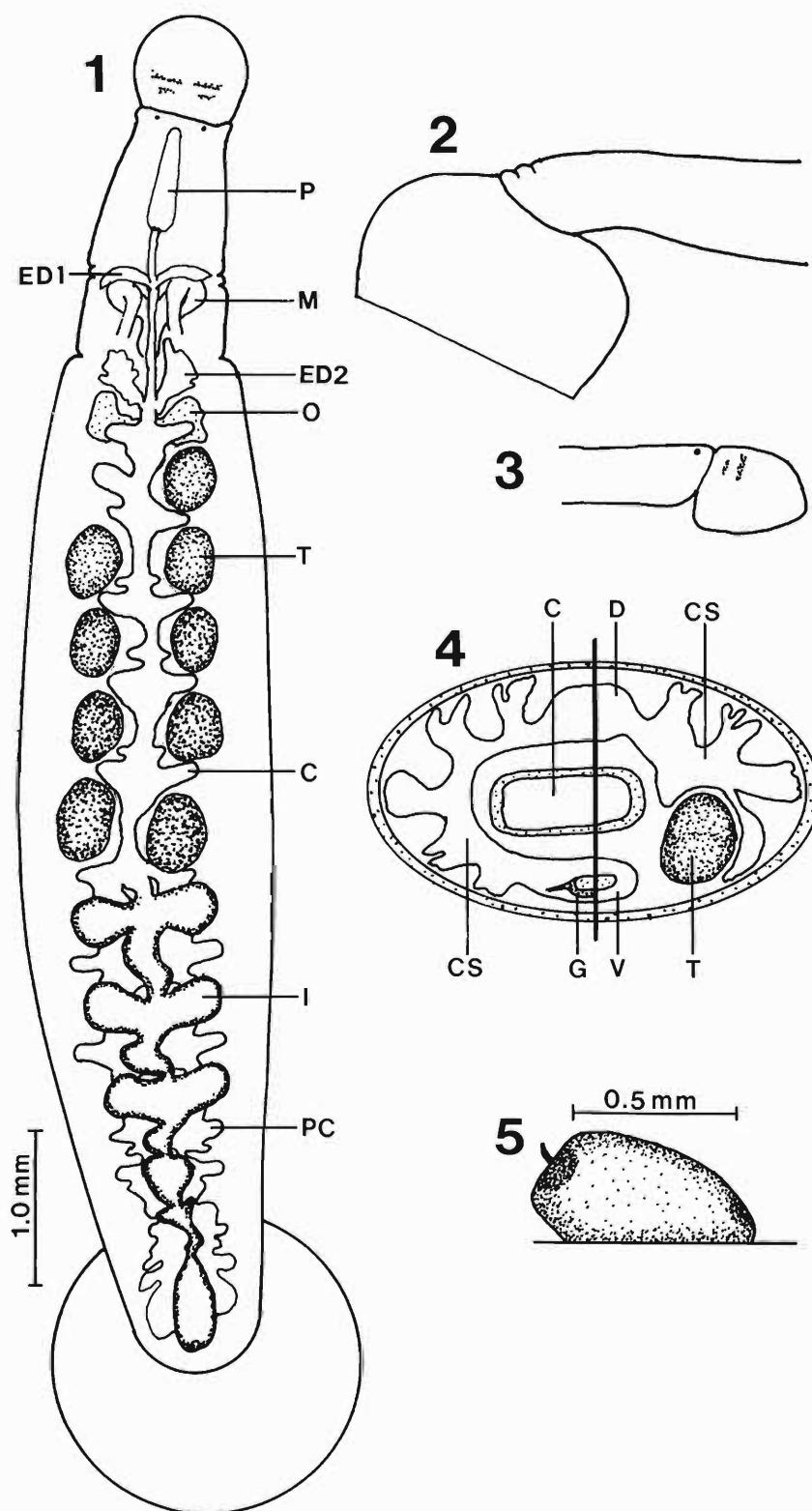
TYPE LOCALITY: Mouth of Chesapeake Bay, Virginia, U.S.A., 37°10'N, 76°00'W. Salinity: 30 ppt. Temperature: 28°C.

ETYMOLOGY: Named for the fish host.

EXTERNAL CHARACTERS (Figs. 1-3; measurements of holotype given first, with measurements of largest specimen in parentheses): Body elongate, subcylindrical to flat, especially after relaxation in weak alcohol; distinctly divided into trachelosome, clitellum, and urosome. Body surface smooth, lacking tubercles, papillae, gills, or pulsatile vesicles. Trachelosome usually devoid of pigment except for paired punctiform black spots dorsally and ventrally on the first and last segments. Clitellum narrower than posterior portion of trachelosome or anterior portion of urosome; first annulus of clitellum wide and distinctly demarcated. Urosome usually unpigmented except for 12 pairs of segmental punctiform black spots dorsally and ventrally. First segment of urosome often has no spots resulting in only 11 pairs in some individuals. Some individuals have faint black pigment in the form of segmental bands on the trachelosome and urosome. Total length, inclusive of suckers, 8.5 (11.0); maximum width 1.5 (2.0). Mouthpore centrally located in discoid oral sucker, 0.5 (0.8) in diameter, and eccentrically attached to trachelosome. Oral sucker unpigmented except for 2 pairs of poorly formed, diffuse eyes that appear as thin, straight, or slightly curved lines (Fig. 1). Eyes occasionally very close together, sometimes appearing as 1 pair. Caudal sucker large and very deeply cupped (Fig. 1, 2), 1.6 (2.2) in diameter, usually unpigmented, but occasionally with 13 faint black pigment bands radiating outward from urosome/sucker junction.

DIGESTIVE SYSTEM: Mouthpore centrally located in oral sucker. Proboscis extending to gan-

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Figures 1-5. *Aestabdella leiostomi* sp. n. 1. Dorsal view of *A. leiostomi* drawn from a whole mount showing general body shape and portions of the reproductive and digestive systems, especially the position of the first (ED1) and second (ED2) pairs of esophageal diverticula. C, crop; I, intestine; M, terminal portion of male reproductive system; O, ovisac; P, proboscis; PC, postceca; T, testisac. 2. Caudal sucker, lateral view. Scale as for Figure 1. 3. Oral sucker, lateral view. Scale as for Figure 1. 4. Diagrammatic reconstruction of the coelomic system based on transverse sections. C, crop; CS, connecting sinus; D, dorsal sinus; G, ganglion; T, testisac; V, ventral sinus. 5. Cocoon, lateral view.



glion in IX; salivary glands located between ganglia in VII and IX. Typical esophageal diverticula emerge from crop in posterior portion of XI and project anteriorly to the level of the ganglion in XI, lying dorsal to ejaculatory bulbs. An unusual, second pair of esophageal diverticula emerge in the anterior portion of XIII and project anteriorly to the level of the ganglion in XII (Fig. 1). These large diverticula did not contain a portion of the blood meal, but were filled with a granular, basophilic material similar to that of the more typical esophageal diverticula located in segment XI. The crop lumen expands between the testisacs in the form of paired diverticula (Fig. 1). Usually there is a second, smaller pair of diverticula (Fig. 1), but these often appeared to be obliterated by the testisacs in large individuals. The intestine and postceca originate immediately posterior to the ganglion in XIX. The intestine has 3 pairs of bulbous diverticula and a series of smaller compartments prior to a tubular rectum (Fig. 1). The postceca are fused with fenestra at each ganglion.

REPRODUCTIVE SYSTEM: Five pairs of large testisacs located intersegmentally in XIV/XV. Vasa deferentia enlarge in XIII and enter loosely coiled epididymides in anterior portion of XIII, continue anteriorly, and become confluent with thick-walled ejaculatory bulbs. At ganglion in XI, ejaculatory bulbs bend ventrad and enter atrial cornua. Terminal portions of ejaculatory bulbs and dorsal portions of atrial cornua covered with accessory gland cells. Atrial cornua merge into common atrium that opens to moderately large bursa that terminates as the male gonopore in the anterior portion of XII.

Female reproductive system typical, with paired, convoluted ovisacs that merge into common oviduct and open through the female gonopore in the posterior portion of XII. Paired, narrow ducts of conducting tissue originate from the ventral body wall at the level of the ganglion in XIII and fuse with ventral portion of each ovisac in the posterior portion of XIV. Cocoons (Fig. 5) measure 0.7 long by 0.4 wide; 20 were deposited overnight around 1 isolated leech.

COELOMIC SYSTEM: Coelomic system consists of dorsal and ventral sinuses and, probably, lateral sinuses; presence of the latter could not be confirmed with certainty. No testicular sinuses. Connecting sinuses between the dorsal and ventral sinuses ramify extensively in the region of the ganglion in each segment to occupy most of the space among the clitellar gland cells (Fig. 4).

Ramifications of the connecting sinuses extend laterally to the position typically occupied by lateral sinuses, suggesting that lateral sinuses are present. Intersegmentally, the dorsal sinus ramifies ventrolaterally, but does not connect with the ventral sinus (Fig. 4).

EXCRETORY SYSTEM: Ten pairs of large nephridia occur intersegmentally in XIII/XIV through XXII/XXIII. The single large trunk of each nephridium originates near the ventral body wall in the posterior portion of the segment preceding the segment in which the nephridium opens through the body wall. Ciliated funnels were not observed. Each nephridium passes posteriorly near the ventral body wall until about the level of the ganglion in the next segment posteriorly where it bends dorsally and then laterally to occupy a mid-lateral position. The nephridium trunk enters a muscular bladder that opens through the body wall just posterior to the ganglion. Thus, the nephridium that originates in segment XIII opens to the outside just posterior to the ganglion in XIV.

Discussion

This leech fits readily in the genus *Aestabdelta*, which is characterized by a smooth, subcylindrical to flat body with well-developed suckers, poorly formed eyes, 7(14)-annulate somites, extensive coelomic system, 5 pairs of testisacs, the presence of conducting tissue, and 10 pairs of large nephridia (Burreson, 1976). The new species described here differs in having 1) mid-body segments that are 6(12)-annulate; 2) a coelomic system with extensive ramifications of connecting sinuses; but 3) lacking testicular sinuses.

Aestabdelta leiostomi is the first member of the genus known from the Atlantic Ocean. The other 2 members of the genus, *A. abditovesiculata* (Moore) and *A. platycephali* (Ingram), are known from the eastern North Pacific (Hawaii and the west coast of the United States) (Moore, 1952; Burreson, 1976) and from Tasmania (Ingram, 1957), respectively. In addition to host and geographical location, and characters listed above, *A. leiostomi* differs from the other members of the genus by the presence of a second pair of esophageal diverticula posterior to the bursa, a larger, much more deeply cupped caudal sucker, and greatly reduced pigmentation.

In the lower Chesapeake Bay, *A. leiostomi* has only been recovered from spot collected from June through September. Leeches were not recovered from spot collected offshore in the mid-

dle Atlantic region, or from croaker collected in the estuary or offshore. Causey (1954) collected specimens from spot collected "offshore" near Pascagoula, Mississippi. However, the number of hosts examined is small and the host and geographic range and temporal distribution of the leech have not been adequately determined.

Externally, *A. leiostomi* superficially resembles *M. philotherma*, which may be present in the same geographical area, although not reported from the same host. The 2 species can be easily distinguished on the basis of caudal sucker size and shape. The caudal sucker of *M. philotherma* is a shallow disc about the same diameter as the maximum body width. The caudal sucker of *A. leiostomi* is very deeply cupped and the diameter is greater than the maximum body width.

Burreson (1989), in a comparison of the new genus *Richardsonobdella* with *Aestabdella*, erroneously stated that *Aestabdella* lacked conductive tissue. Both *Richardsonobdella* and *Aestabdella* possess conductive tissue; thus, the 2 genera are more closely related than previously believed. However, *Richardsonobdella* is still justified because it lacks large, segmental neophridia.

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Literature Cited

Appy, R. G., and M. J. Dadswell. 1981. Marine and estuarine piscicolid leeches (Hirudinea) of the Bay of Fundy and adjacent waters with a key to species. *Canadian Journal of Zoology* 59:183-192.

Burreson, E. M. 1976. *Aestabdella* gen. n. (Hirudinea: Piscicolidae) for *Johanssonia abditovesiculata* Moore 1952 and *Ichthyobdella platycephali* Ingram 1957. *Journal of Parasitology* 62:789-792.

—. 1989. *Richardsonobdella lineatae*, gen. et sp. nov. (Hirudinea), a parasite of *Meiacanthus lineatus* (Pisces: Blenniidae) from Heron Island, Great Barrier Reef. *Australian Journal of Zoology* 37:89-93.

—, and D. E. Zwerner. 1982. The role of host biology, vector biology, and temperature in the distribution of *Trypanoplasma bullocki* infections in the lower Chesapeake Bay. *Journal of Parasitology* 68:306-313.

Causey, D. 1954. Marine leeches. *The Educational Focus* 25:19-23.

Ingram, D. M. 1957. Some Tasmanian Hirudinea. *Papers and Proceedings of the Royal Society of Tasmania* 91:191-232.

Moore, J. P. 1952. New Piscicolidae (leeches) from the Pacific and their anatomy. *Occasional Papers of the Bernice Bishop Museum* 21:17-44.

Sawyer, R. T. 1986. *Leech Biology and Behaviour*. Vol. II. *Feeding Biology, Ecology and Systematics*, Oxford University Press, New York. 374 pp.

—, A. R. Lawler, and R. M. Overstreet. 1975. Marine leeches of the eastern United States and the Gulf of Mexico with a key to the species. *Journal of Natural History* 9:633-667.